REMARKS

The Applicants thank the Examiner for the careful consideration of this application. The Office Action dated March 22, 2011 has been received and its contents carefully considered. Claims 1-4, 6-24, 26-29, and 34-53 are currently pending in this application. Claims 1-4, 6-12, 20-22, 26-27, 34, 36-38, 40, 42-43, 46, 48, 50, and 52-53 are currently under examination. Claims 13-19, 23-24, 29, 35, 39, 41, 44-45, 47, 49 and 51 are currently withdrawn in response to a previous requirement for restriction and election of species. New claims 46-53 are supported throughout the specification, for example, on page 6, line 21. Claims 1, and 34-36 are amended for clarification purposes only. Based on the foregoing amendments and the following remarks, the Applicant respectfully requests that the Examiner reconsider all outstanding rejections and that they be withdrawn.

Restriction/Election and Rejoinder

Claims 13-19, 23-24, 29, 35, 39, 41, 44-45, 47, 49, and 51 are currently withdrawn from examination in response to the previous requirement for restriction and/or election of species. New claims 46, 48, 50, and 52-53 fall within groups I and III as defined in the Restriction and should be examined. Applicants respectfully request examination of claims 1-4, 6-12, 20-22, 26-27, 34, 36-38, 40, 42-43, 46, 48, 50, and 52-53.

Applicants respectfully request examination be expanded to include the non-elected species (M.P.E.P. § 803.02). Applicants respectfully request rejoinder of method claims that depend from, or require all the elements of, an allowable claim (M.P.E.P. § 821.04).

Claim Objections

On pages 8-9, the Office Action objects to the claims for an extraneous "38" appearing after claim 39. The only "38" that appears in the vicinity of claim 39 is actually part of claim 39, in the phrase "according to claim 38." Applicants request the objection be withdrawn.

Claim Rejection – 35 U.S.C. § 112

On pages 2-3, the Office Action rejects claims 1-4, 6-12, 20-22, 26-28, 34, 36 and 38 under 35 U.S.C. § 112, second paragraph, as allegedly indefinite. Applicants respectfully traverse.

The Office Action objects to the phrase "greater than 5:1 to 95:1" as unclear whether ratios greater than 95:1 are encompassed. However, the full phrase "range greater than 5:1 to 95:1" clearly denotes two endpoints, not an open-ended set. If ratios greater than 95:1 were encompassed by the range, the ratio of 95:1 would be superfluous and meaningless. Since this cannot be the case, the phrase "range greater than 5:1 to 95:1" obviously means the range of values greater than but not equal to 5:1 as a lower limit, and less than or equal to 95:1 as an upper limit. In the interest of advancing prosecution, Applicants have reworded the range to state a "range from greater than 5:1 to 95:1." Applicants request the rejection be withdrawn.

Claim Rejection – 35 U.S.C. § 103

On pages 3-8, the Office Action rejects claims 1-4, 6-12, 20-22, 26-28, 34, 36, 38, 40, 42 and 43 under 35 U.S.C. § 103(a) as allegedly obvious with respect to Wang et al. (U.S. 6,348,621) when considered with Pearson et al. (WO 98/41495) and Schafer et al. (US 2003/0191339). Applicants respectfully traverse.

First, as to claims 1, 26, 34, 36, 38, 40 and 42, the Office Action errs on page 4, stating that the claims are directed to catalyst system where the "ration [sic] of ligand to metal is at least 2:1 and the ratio of acid to ligand is at least 2:1." This is incorrect. Claims 1, 34, and 36 require, for example, that the acid is present in the "range from greater than 5:1 to 95:1." Claims 38, 40, and 42 require, for example a ratio of ligand to metal "in the range 5:1 to 750:1." Claim 26 requires, for example a reaction medium with ethene. None of the independent claims require a polymeric dispersant. Applicants respectfully request the Office Action address all the elements of the claims, as required by M.P.E.P. § 2143.03.

Second, with respect to claims 1, 26, 34, 36, 38, 40 and 42, one of ordinary skill would have no reason to combine the two references to arrive at the claimed invention. On page 5, the Office Action concludes that one of ordinary skill would be motivated to optimize the process described by Wang et al. by addition of excess acid. The Office Action concludes that Pearson's teaching motivates the adjustment of the ligand:metal ratio in order to extend the catalysts useful life. This is incorrect. Pearson et al. makes no mention of the effect of ligand to metal ratio on catalyst life. Concerning catalyst life, Pearson's results are true only in relation to the use "of a high molar ratio of ethylene to carbon monoxide in the gas in contact with the liquid phase" (see Pearson et al., page 1, lines 28-30). Pearson et al. does not teach that a high acid:ligand ratio gives increased life to the catalyst or that an adjustment of the ligand:metal ratio gives increased life to the catalyst.

Pearson et al. does state, however, "the quantity of anion (acid) present is not critical to the catalytic behavior of the catalyst system" (see Pearson et al., page 5, lines 25-26). In the examples, Pearson et al. reports an increased yield when a 10-fold excess of acid (relative to Pd) is used, when compared with a 3-fold excess (relative to Pd) (see Pearson et al. Table 1, page 7). However, these experiments are performed with only 1:1 ratio of ligand to Pd. These experiments say nothing about the effect of acid:ligand ratio or ligand:metal ratio on catalyst life.

If Pearson's primary focus is on catalyst life, as asserted by the Office Action, then Pearson's statement that the "quantity of anion is not critical" should also be taken in the same context. In other words, Pearson et al. states that the quantity of acid (when providing the source of anion) is not critical to the catalyst life. Therefore, Pearson et al. provides a clear teaching that catalyst life cannot be affected by acid levels. This is also consistent with the experimental results showing that the acid:ligand ratio may affect the reaction yield, which is different from catalyst life.

In particular, Pearson et al. teaches on page 5, lines 1-5 that the most preferred range of ligand to metal is from 1:1 to 5:1. Therefore the skilled person is not taught to optimize for catalyst life above 5:1 as claimed in several claims. In addition, as stated previously, the skilled person is taught that the quantity of anion is not critical. There is no teaching or suggestion in Pearson et al. of simultaneous elevated acid to ligand and ligand to metal ratios.

In fact, other references teach away from increasing both the ligand:metal ratio and the acid:ligand ratio. There is no reason in Wang et al., or Pearson et al., or the combination of the two,

to expect any benefit from increasing both the ligand:metal ratio and the acid:ligand ratio to the ratios claimed in claims 1, 26, 38, 40, or 42. In contrast, other references disclose disadvantages to increasing the ligand ratio, such as those described on pages 2, lines 20-25 of the specification. Likewise, other references disclose disadvantages to increasing the acid as described on page 2, lines 27-33 of the specification. Thus, one of ordinary skill would be skeptical of increasing the ligand:metal ratio or the acid:ligand ratio because of these known disadvantages.

Accordingly, one of ordinary skill in the art would have no reason or motivation, based on the combination of Wang et al. and Pearson et al., and in light of known disadvantages to increases in ligand:metal ratio and acid:ligand ratio, to modify the reaction conditions to increase both the ligand:metal ratio and the acid:ligand ratio to the ratios claimed in claims 1, 26, 38, 40, or 42. One of ordinary skill would have no expectation of success nor expectation of an improvement in catalyst life.

For at least these reasons, the claims are allowable over the combination of Wang et al. and Pearson et al. Schafer et al. does not cure the deficiences of Wang et al. and Pearson et al., because it is directed only to the use of polymers containing nitrogen (see Schafer et al., abstract) Claims 2-4, 6-12, 20-22, 27-28, 34, 36, and 43-53 depend, directly or indirectly from claims 1, 26, 38, 40, or 42, and are allowable for at least the same reasons. Applicants respectfully request the rejection be withdrawn.

Response to Office Action Remarks

In paragraph 11a and again in paragraph 11h, the Office Action asserts that Pearson's quoted statement "the quantity of anion present is not critical" (see Pearson et al., page 5, lines 25-26) does not mean what it says. The Office Action creates a different meaning, that Pearson's statement means that the *manner of supplying* the anion is not critical. This is inconsistent with the quoted statement and its context. For example, the previous paragraph (see Pearson et al., page 5, lines 19-24) discloses that the anion may be introduced as one or more of:

1. An acid having a pKa measured in aqueous solution of less than 4
2. A salt with a cation that does not interfere with the reaction
3. A precursor (such as an ester)

Thus, the term "anion" references all three sources thereof. The sentence "the quantity of anion is not critical to the behavior of the catalyst system," clearly states the "quantity of the anion" which by definition includes the acid as stated above. The Office Action's position appears to be that if the acid is an anion, the amount of anion is not critical, but this is not consistent with the previous paragraph of Pearson. Pearson et al. therefore teaches:

1. that the anion should be present;
2. that the anion can be present as an acid or otherwise; and
3. that the quantity present is not critical, irrespective of how it is present or its source.

Pearson goes on to indicate that when the anion is supplied as both an acid and a salt, the relative proportion of the acid and salt is not critical (see Pearson et al., page 27-28). In other words, the amount of anion is not critical, and the proportion of acid that makes up the anion is also not critical. The next sentence (see Pearson et al., page 5, lines 26-27) recites various possible ratios of anion to palladium, and further supports the conclusion that Pearson actually does mean "quantity of the anion." This sentence would have no meaning if, as the Office Action contends, "quantity of the anion" means "manner of supplying the anion." Under no reasonable reading of Pearson et al. can the statement "the quantity of the anion" mean the "manner of supplying the anion."

Pearson's examples are performed only with 1:1 ratio of ligand to metal, however, and so have no bearing on comparison improvements where the ligand is present in at least a 2:1 molar excess compared to said metal or said metal in said metal compound. Furthermore, an increased "yield," (see Pearson et al., Table 1, page 7) which the Office Action appears to mistakenly equate with turnover number, cannot be equated to an increased turnover number (TON). Quite the contrary may be true. High yielding catalysts can quickly become spent and give low TON compared to medium or low yielding catalysts. TON is a measure of catalyst life, not yield. Pearson does not teach or imply that high acid:ligand ratios and simultaneous increased ligand:metal ratios give increased catalyst life. The only example of Pearson which relates to catalyst life or TON is example 4, and this relates to a ligand to metal ratio of 1:1 and gives no information on the impact on TON of varying either the ligand:metal ratio or the acid:ligand ratio, but shows only an increase in TON based on increases in the ethylene:CO ratio.

In paragraph 11b, the Office Action ignores the teachings of relevant prior art that teach away from the current invention. This is unacceptable under M.P.E.P. § 2143.01(II) and M.P.E.P. § 2145(X)(D)(1). Applicants request all the relevant information be considered.

In paragraph 11c and again in 11i, the Office Action concludes that Pearson's goal is to prolong life and activity of the catalyst. However, Pearson's results are true only in relation to the use "of a high molar ratio of ethylene to carbon monoxide in the gas in contact with the liquid phase" (see Pearson et al., page 1, lines 28-30). Pearson et al. does not teach that a higher acid:ligand ratio gives increased life to the catalyst. Pearson does not teach or imply that high acid:ligand ratios and simultaneous increased ligand:metal ratios give increased catalyst life. The only example of Pearson which relates to catalyst life or TON is example 4, and this relates to a ligand to metal ratio of 1:1 and gives no information on the impact on TON of varying either the ligand:metal ratio or the acid:ligand ratio, but shows only an increase in TON based on increased ethylene:CO ratio.

In paragraph 11d, the Office Action argues that Pearson et al. is primarily concerned with catalyst life span, not reaction rate, and that Pearson et al. describes broad ranges of ligand:metal ratios. Even so, there is no teaching that the catalyst life span is linked to high acid:ligand ratios and simultaneously high ligand:metal ratios. As stated previously, Pearson et al. teaches that the catalyst life is linked to the ethylene:CO ratio, and that the acid level is not critical. Therefore, to the extent that Pearson relates to catalyst life, this is linked to the ethylene:CO ratio taught as the invention in Pearson et al.,

Furthermore, if Pearson's primary focus is on catalyst life, then Pearson's statement that the "quantity of anion is not critical" should also be taken in the same context. In other words, Pearson et al. states that the quantity of acid (when providing the source of anion) is not critical to the catalyst life. Therefore, Pearson et al. provides a clear teaching that catalyst life cannot be affected by acid levels. Thus, improvements in catalyst life based on the combination of increased ligand:metal and acid:ligand ratios is unexpected.

In paragraph 11e, the Office Action ignores Applicants argument that given the teaching of Pearson et al., one might expect an increase in reaction rate by adjusting the acid:ligand ratio, but would not predict any benefit from increasing both the ligand:metal ratio and acid:ligand ratio. The Office Action simply states only that Pearson et al. teaches ligand:metal rations encompassing those claimed. Unless the Office Action can provide evidence to predict an improvement based on increasing both the acid:ligand and ligand:metal ratios simultaneously, one of ordinary skill in the art would have no reason to modify the those reaction conditions with any degree of predictability. Consequently, an increase in catalyst life is unpredicted and unexpected.

In paragraph 11f, the Office Action ignores Applicants arguments that the Office Action relies on an improper inherency standard. The Office Action states, instead, that inherency is not a requirement for obviousness. However, one entire premise of the Office Action is that one of ordinary skill would randomly vary the reaction conditions within and beyond broad ranges described by the combination of Wang et al. and Pearson et al. to somehow arrive at the claimed invention by "optimizing" the reaction. However, the parameter to be optimized, according to the Office Action, is not a parameter based on ligand:metal ratio or acid:ligand ratio, but on ethylene:CO ratio. Based on the evidence from Pearson et al. and Wang et al., it is equally likely that the optimal ligand:metal ratio – with respect to catalyst life – is lower than 2:1, rather than greater than 2:1. Thus, the Office Action thus presumes, even if it does not state, that increased catalyst life is an inherent feature of increased ligand:metal ratio, which is an improper inherency conclusion. This presumption is essential to the Office Action's final conclusion. Without it, the rejection must be withdrawn.

In paragraph 11g, the Office Action ignores Applicants argument that only result-effective variables can be optimized (M.P.E.P. 2144.05(II)(B)), stating only that Pearson et al. teaches broad ranges that encompass those claimed. However, the Office Action's essential premise is that one of ordinary skill would optimize for a particular feature (catalyst life) based on the teaching of Pearson et al. But, the key parameter in Pearson et al. is the ethylene:CO ratio to achieve higher reaction

rates or catalyst life. There is no indication in Pearson et al. or Wang et al. that an improvement in catalyst life can be achieved by varying the ligand:metal and acid:ligand ratios. The person of ordinary skill has no reason to check turnover number against ligand:metal or acid:ligand ratios based on the teachings of Wang et al. and Pearson et al. Furthermore, the person of ordinary skill has no reason to expect an increase in turnover number by altering those ratios. The skilled person is, instead, directed to optimize for ethylene:CO ratio.

Conclusion

All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider all presently outstanding rejections and that they be withdrawn. Applicant believes that a full and complete reply has been made to the outstanding Office Action and, as such, the present application is in condition for allowance. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is hereby invited to telephone the undersigned at the number provided.

The Commissioner is authorized to charge any deficiency in any patent application processing fees pursuant to 37 CFR § 1.17, including extension of time fees pursuant to 37 CFR § 1.17(a)-(d), associated with this communication and to credit any excess payment to Deposit Account No. 22-0261.

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Respectfully submitted,

By /Keith G. Haddaway/
Keith G. Haddaway, Ph.D.
Registration No.: 46,180
Michael E. Nelson, Ph.D.
Registration No.: 64,115
VENABLE LLP
P.O. Box 34385
Washington, DC 20043-9998
(202) 344-4000
(202) 344-8300 (Fax)
Attorney/Agent For Applicant